

CARBON CAPTURE AND WATER EMISSIONS TREATMENT SYSTEM (CCWESTRS) AT FOSSIL-FUELED ELECTRIC GENERATING PLANTS

Background

PRIMARY PROJECT PARTNERS

National Energy Technology
Laboratory

Tennessee Valley Authority

Electric Power Research
Institute

CUSTOMER SERVICE

800-553-7681

WEBSITE

www.netl.doe.gov

A 100-acre reclaimed surface mine area at the 2,558-megawatt Tennessee Valley Authority (TVA)-owned Paradise Fossil Plant near Drakesboro, Kentucky, is serving as the demonstration site where by-products from the plant's wet scrubber will be used to amend the soils. Wastewater from the flue gas desulfurization process that targets SO_2 control and selective catalytic reduction for NO_x control will be used to irrigate the trees and herbaceous cover. The plants will in turn capture and store carbon dioxide while reducing pollutant loadings to the local watershed.

The "Carbon Capture and Water Emissions Treatment System" (CCWESTRS) will be constructed at the Paradise Fossil Plant on existing, poorly reclaimed coal mined land by establishing plantings of vegetative species. Sequestration will occur through carbon uptake by trees, with biomass recovery for the forest products industry, and in the soil, which currently has low carbon levels. An average of 1.5 to 3 tons of carbon per acre/year is estimated to be sequestered in the CCWESTRS over a 20-year period.

The Tennessee Valley Authority will design and install a system to drip irrigate Flue Gas Desulfurization (FGD) wastewater over the entire site. Tree growth and response, along with other relevant observations will be performed over the course of the project through 2003 to determine effectiveness of the integrated technologies to sequester carbon and accomplish other project benefits.



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CONTACT POINTS

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The FGD water poses the major obstacle for the project. Toxic in most respects and requiring treatment before its ultimate discharge into the Green River, the FGD water contains certain boron compounds, which hinder growth and survival of trees and other plants at concentrations above 2-4 mg/l. The Paradise FGD water has over ten times that concentration.



Flue Gas Desulfurization wastewater pond

Primary Project Goal

To demonstrate a "whole plant" approach using by-products from a coal-fired power plant to sequester carbon in an easily quantifiable and verifiable form.

Objectives

- Provide economically competitive and environmentally safe options to offset projected growth in U.S. baseline emissions of greenhouse gases after 2010
- Achieve the long-term goal of \$10/ton of avoided net costs for carbon sequestration
- Provide half of the required reductions in global greenhouse gases by 2025

Benefits

- Developing a potentially widely applicable passive technology for water treatment for criteria pollutant release reductions
- Using power plant by-products to improve coal mine land reclamation and carbon sequestration
- Developing wildlife habitat and green-space
- Generating Total Maximum Daily Load (TMDL) credits for water and airborne nitrogen
- Developing additional forest lands that will be available for timber harvesting